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CITY OF STOCKTON
ENVIRONMENTAL IMPACT STATEMENT
MAIN WATER QUALITY CONTROL PLANT

March 1, 1972

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March 1, 1972

Mr. T. J. Dosh
Director of Public Works
City Hall
Stockton, California

Dear Mr. Dosh:

We are submitting with this letter our report assessing the environmental impacts of enlargement and modification to the Stockton Main Water Quality Control Plant.

The project will result in significant environmental benefits to the San Joaquin River, the Delta, and the City of Stockton. Many of the adverse impacts associated with wastewater discharge from this plant will be eliminated or mitigated to tolerable levels. The few unavoidable adverse effects of the project are acceptable or justifiable in view of the needs of the City and the planned development of the area.

The requirements of the National Environmental Policy Act and the California Environmental Quality Act will be fulfilled by the statement.

We appreciate the opportunity to assist the City of Stockton in the preparation of this Environmental Impact Statement. We wish to gratefully acknowledge the assistance of your staff and Brown & Caldwell Consulting Engineers who made major contributions to this effort.

Respectfully submitted,

JONES & STOKES ASSOCIATES, INC.

Robert L. Jones

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IMPACTS OF THE CITY OF STOCKTON
MAIN WATER QUALITY CONTROL PLANT

The City of Stockton intends to enlarge and modify the Main water quality control plant on Navy Drive during 1972-74. The principal features of the project relate to enlargement of primary and secondary waste treatment facilities and the construction of new facilities to collect and dispose of solids and to remove algae and other particulate matter from the final effluent. These additions permit the plant to meet the sewerage needs of Stockton until 1980-90 depending on circumstances of population and industrial growth. Quality of effluent shall be in compliance with requirements and policies of the Central Valley Regional Water Quality Control Board.

Impacts

Beneficial Impacts

1. Both the capacity and quality of sewerage service to the City of Stockton are to be improved.
2. There will be a reduction in the amount of oxidizable organic matter discharged to the San Joaquin River.
3. The amount of total nitrogen discharged shall be 3 mg/l or less.
4. The general character of the discharged wastewater shall be improved in both quality and consistency of quality.

5. The total waste load on the San Joaquin River and the Delta shall be significantly reduced in comparison to past years.
6. Dissolved oxygen shall be maintained at 5 mg/l or greater in the Stockton deep-water channel.
7. Reductions in the emission of nitrogen and other waste constituents shall improve opportunities for meeting the established receiving water standards.
8. Beneficial uses of the river shall be improved by the proposed changes in treatment at the Main plant.
9. Improvements in architecture, landscaping and odor control will make the plant more aesthetically pleasing.
10. There is a benefit in having waste treatment capacity available to service future growth in population and industrial development.

Adverse Impacts

1. The discharge of oxidizable organic wastes, dissolved solids and nitrogen into the Old River to Turner Cut reach of the San Joaquin River is an adverse impact, because this reach is presently overloaded with these waste constituents even without the Stockton discharge.
2. Incineration of solids may be an adverse impact in that gases and particulate matter are emitted to an atmosphere presently not in conformance with air quality standards.

3. Incineration of sludge destroys a material having a beneficial use as a soil conditioner and low grade fertilizer.
4. Installation of a 60-inch wastewater conduit across the San Joaquin River will temporarily impose adverse impacts on the river.
5. Chlorination of the effluent may cause toxicity to aquatic life in the immediate vicinity of the discharge.
6. Construction activities will impose inconvenience on traffic and cause increases in noise and dust.

Problematical Impacts

1. At sometime in the future, the use of fine agricultural land for 640 acres of oxidation pond may be classified as a poor land use practice.
2. The proposed changes in plant capability may encourage population and industrial growth in Stockton, which in turn may have subsidiary adverse impacts on the environment.

Probable Adverse Impacts Which Cannot Be Avoided

1. The discharge of organic and nutrient-laden wastewater to the San Joaquin River.
2. Use of agricultural land for wastewater treatment.
3. Disruptions associated with construction activities.

Mitigation Measures Proposed to Minimize Impacts

1. The enlargement and modification of the plant is designed to mitigate impacts of the wastewater on the San Joaquin River.
2. Air control and prechlorination treatments are used to lessen the impact of odor.
3. Damages and disruptions associated with construction will be moderated by good planning and close supervision.
4. Architectural improvements will be used to ameliorate the visual impact of a waste treatment plant.

Alternatives to the Proposed Action

1. To avoid the proposed action would encourage and prolong environmental degradation of the San Joaquin River and Delta.
2. Relocation of the plant would cause unmanageable disruptions in sewerage service and unreasonable cost.
3. Alternatives to the point and method of discharge were considered in the San Francisco Bay-Delta Water Quality Control Program. It was recommended that wastewaters be collected, treated and discharged locally. It is desirable to keep these waters available for reuse in the Stockton area.
4. A program for reuse rather than direct discharge may result from the basin-wide water quality planning now in progress for the State Water Resources Control Board.

Irreversible and Irretrievable Commitments of Resources

1. There are no irretrievable commitments of resources.
2. The present and proposed waste treatment facility may establish an irreversible pattern of wastewater treatment for Stockton.

Local Objections to the Project, If Any

1. There are no known objections to the project.

CITY OF STOCKTON
ENVIRONMENTAL IMPACT STATEMENT
MAIN WATER QUALITY CONTROL PLANT

Introduction

Modification and enlargement of the City of Stockton's Main water quality control plant is scheduled to occur during 1972 and 1974. This study provides an independent analysis of environmental impacts resulting from changes in treatment facilities. The report describes the nature of the service and discharge areas, and environmental impacts that are likely to happen as a result of the proposed changes. The report also describes the schedule and principal features of the project and states guiding environmental philosophies pertinent to potential impacts. The report is intended to provide information, analysis, and evaluation of proposed actions in a manner and depth that allows the reader to make environmental judgements about the project.

For a number of years water quality in the San Joaquin River near Stockton has been less than desirable, especially during summer and autumn. Poor water quality is associated with eutrophication and low levels of dissolved oxygen. Population and industrial growth is occurring and causing the problem to intensify. Treatment capacity has not kept pace with need, partly because industrial uses are unusual and seasonal. The plant does not meet the requirements and policies

of the Central Valley Regional Water Quality Control Board. For these reasons modification and enlargement of the plant will be done before February 1974, enabling the City to meet its environmental responsibilities. This phase of development in plant capacity is expected to meet wastewater treatment needs of the service district until 1980.

The principal features of the project relate to the enlargement of primary and secondary waste treatment facilities, incineration of solids, and the removal of algae and other organic matter from the final effluent. These changes shall improve the waste effluent to a level that meets waste discharge requirements and receiving water standards in the San Joaquin River.

Study Team and Procedures

Jones & Stokes Associates were responsible for the environmental impact statement. They were assisted by:

Brown and Caldwell Consulting Engineers

City of Stockton, Department of Public Works

The project was discussed and coordinated with representatives of the Central Valley Regional Water Quality Control Board, State Water Resources Control Board, Environmental Protection Agency, and the San Joaquin County Air Pollution Control District.

A long-range sewerage master plan for the Stockton metropolitan area was started by the City and done in 1964 and 1965 by Brown and Caldwell. Some changes in the plan have occurred, but it formed the basis for the proposed projects which represent

a phase in the ultimate development of the plant. The impact statement is the result of the integration of information and data about the plan and existing conditions of the environment. The impacts of proposed actions on the existing environments are evaluated and measures taken to avoid detrimental impacts are described.

Impact Assessment

There are three classes of environmental impacts -- direct, indirect and problematical.

1. Direct impacts are those that affect man's senses, health or intellect. The magnitudes of direct impacts are based on the number of people concerned and the degree to which they may be affected.
2. Indirect impacts are those that affect resources other than man. Magnitude assessment is based on the degree of change in resource quality and quantity.
3. Problematical impacts are those that may occur as a result of activities or developments subsidiary to the proposed project.

An area broader than the boundaries of the proposed project was considered because project impacts are commonly associated with entities beyond project boundaries, and project changes are part of a master plan and associated activities that deal with a large district.

PROJECT FACILITIES

History of Sewerage Developments

Public sewerage in Stockton began prior to 1893 when existing sewers were connected to a cesspool with final discharge to the San Joaquin River. Later, wastewater discharge was directly to the river, resulting in foul conditions in Mormon Channel. These conditions led to construction in 1918 of a sewage collection system and the Smith's Canal Sewage Treatment Plant (STP). In 1922 the Main plant was constructed at its present site on Navy Drive (West Charter Way) adjacent to the San Joaquin River. These two plants provided a minimum amount of treatment until after World War II.

Poor water quality conditions and overloading of the collection and treatment facilities threatened economic development in Stockton by 1945. To alleviate this situation, primary and secondary treatment structures were installed at the Main plant on Navy Drive. Between 1945 and 1964 rapid urban development north of the Calaveras River caused construction of the North and Lincoln Village waste treatment plants. During this period, the Smith's Canal STP was abandoned and its service system connected to the Main plant, resulting in the installation of additional primary and secondary units and 200 acres of oxidation pond.

Despite these increases in primary and secondary treatment capacity, organic loadings imposed upon the river exceeded its assimilative capacity during peak periods of food processing,

i.e., July-October. The Regional Water Quality Control Board issued a Cease and Desist Order in February 1963 directing the City to comply with effluent disinfection requirements and to develop a program and schedule for compliance with the Board's dissolved oxygen requirements for the San Joaquin River. This situation prompted completion of additional treatment works in 1964.

It was also recognized that an integrated and comprehensive sewage plan was needed for the Stockton area. In January 1964 the City entered into an agreement with Brown and Caldwell to prepare a sewerage plan. Subsequently, a master plan was developed and reported that provided sewerage projects for immediate construction and formulated long-range programs for future installations. This report[1] prepared in 1965 contains background information for the proposed project which will meet the needs of the district until 1980.

Additional reports[2,3,4] pertaining to the proposed project, were recently written by Brown and Caldwell which describe the design of the plant and the benefits of the plant to water quality in the San Joaquin River. They respond to wastewater discharge requirements, interim basin water quality policies, and the San Francisco Bay-Delta water quality control program.

Waste Discharge Requirement

New waste discharge requirements were established on January 14, 1969 for the Main plant (Appendix A). The plant was given five years to meet these requirements except for dissolved solids which was extended to 10 years. Meanwhile, requirements adopted in 1951 remain in effect.

Description of Project

Enlargements and modifications of the City of Stockton's Main water quality control plant have been laid out for an ultimate average dry weather flow (ADWF) of 101 mgd. This project includes facilities to increase present plant capacity to an ADWF of 67 mgd and provides new treatment process units to improve effluent quality and solids disposal. For reference the present ADWF is 16 mgd and with canning season flows over 45 mgd. Proposed enlargements and modifications include (a) additional grit removal and screening capacity, (b) secondary treatment facilities consisting of major enlargements to trickling filtration units to provide for biological oxidation of both carbonaceous and nitrogenous organic material, (c) solids treatment and disposal works consisting of digester modifications, sludge lagoon enlargement, sludge conditioning units, solids dewatering and incineration equipment, (d) tertiary treatment facilities consisting of tertiary pumping units, coagulation-sedimentation tanks, dual media rapid sand filtration units, (e) chlorination facilities consisting of chlorine storage,

handling, metering, and injection equipment together with contact channel and effluent siphon to Burns Cutoff, (f) new administration and laboratory building and new maintenance building, and (g) miscellaneous improvements to existing treatment facilities (see Figure 1 for hydraulic flow scheme).

In the above tabulation, items (a) and (c) are a part of the existing treatment process. Treatment units which accomplish these process steps will continue to be used with additional units being constructed as the demand develops.

The largest single problem relative to meeting waste discharge requirements is attributable to the seasonal processing of foods. The maximum 24-hour flow during the canning season is currently three times the average dry weather flow (ADWF) during non-canning seasons. The ratio for biochemical oxygen demand (BOD) loading is approximately 6 to 1. These loads occur during the months June through October when there is the least assimilative capacity in the river. As an illustration of the plant loading problem, projected hydraulic, BOD and suspended solids entering the Main plant for 1970, 1985 and 2020 are tabulated below:

	Flow			BOD			Suspended Solid		
	ADWF		Max. Canning	ADWF		Max. Canning	ADWF		Max. Canning
1970	16	-	45	38	-	235	21	-	165
1985	26	-	70	60	-	310	35	-	225
2020	49	-	93	120	-	375	65	-	260

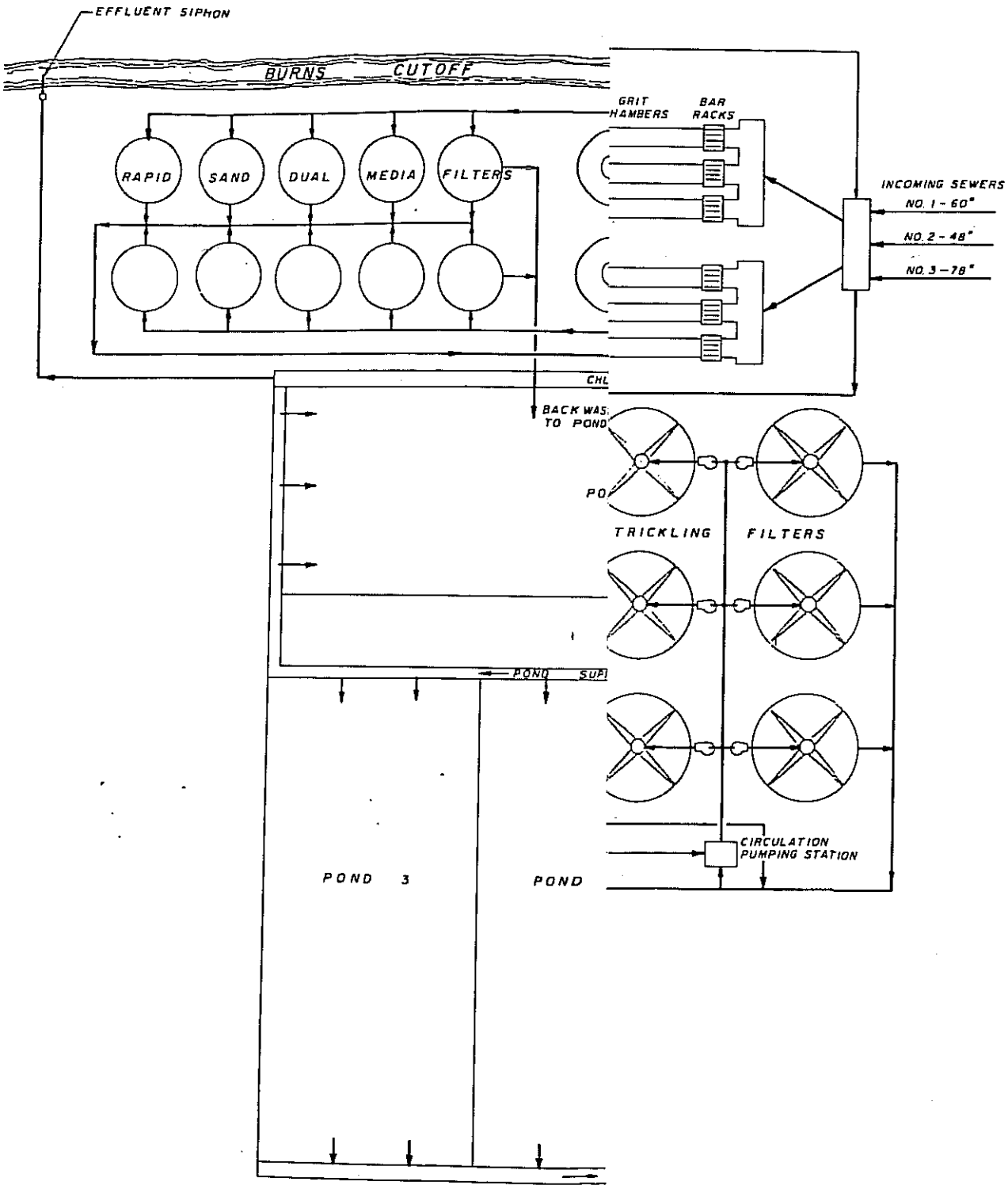

Fig. 1. FLOW DIAGRAM

The ultimate or saturation population corresponding to 54 million gallons per day (mgd) ADWF and 146 mgd peak wet weather flow (PWWF) is 275,000 persons. To cope with these increases in plant loading, greater plant capacity and the involvement of different types of treatment are being brought into use resulting in further improvement in the quality of the wastewater effluent.

During the canning season, the maximum capacity of the secondary units will be required and utilized. The various forms of nitrogen, primarily ammonia, which must be reduced to a combined total of 3 mg/l to comply with the discharge requirements, will be substantially removed by the oxidation ponds and tertiary filtration. In the winter season, when organic loadings are much less, the trickling filters will themselves convert ammonia-nitrogen to the nitrate form, which in turn will be converted to nitrogen gas (denitrified) in the ponds, or removed in the form of algal cells by sedimentation and tertiary filtration.

After the wastewater has been treated by the primary and secondary units, and the oxidation ponds, the original sewage organic matter will be highly oxidized; that is, it will be stable and will not require further use of oxygen. The treated flow, however, may contain quantities of algal cells which have to be removed prior to discharge to the river. Their removal is accomplished in the tertiary treatment stage consisting of coagulation, flocculation and sedimentation tanks, and rapid sand filters.

These units, as a group, are similar to a standard water filtration plant used to treat a city water supply. After filtration the higher purified effluent will be disinfected using chlorine gas and discharged to Burns Cutoff which flows into the San Joaquin River west of Rough and Ready Island, downstream from the "settling basin".

Proposed new treatment facilities have been phased into two categories: (1) those needed within the next five years to meet increased loadings and new discharge requirements, and (2) those needed for ultimate development of the service area. Facilities needed initially are sized to provide for loading conditions expected by about the year 1980. Population and industrial growth projections for this time period are expected to be realistic, thus the initial enlargement will suffice for a reasonable period of time before the plant again has to be expanded. To remedy existing problems in the San Joaquin River, this work must be completed before February 1974.

Bypass and Flooding

The possibility of bypassing due to mechanical failure at any of the pumping stations is minimized by providing pumping capacity at each pumping station to carry peak design flow with the largest unit out of service.

Power for both the raw sewage and secondary effluent pumping stations is generated at the plant by engine generators fueled with back-up by both liquified petroleum and natural gas supplies. This arrangement avoids the common failure -- electrical service outage during severe storms.

The very large amount of storage provided by the oxidation ponds affords virtually complete protection against discharge of partially treated effluent resulting from temporary failure of any of the treatment processes. In the future treatments will not handle flows exceeding 100 mgd; consequently, excess flow that lasts for only an hour or so may be shunted to the oxidation ponds. Detentions during the peak of the canning season, with no allowance for evaporation, are 23 and 15 days for the initial stage and at ultimate development, respectively.

There has been no flooding at the plant for over 20 years and none is expected.

Alternatives to the Project

Two basic alternatives for treatment and disposal of Stockton wastewater were considered in the final report on the San Francisco Bay-Delta Water Quality Control Program[5] prepared in 1969 by Kaiser Engineers for the State Water Resources Control Board. These were (1) export of Stockton wastewaters to the proposed Bay-Delta regional system and (2) continued local treatment and disposal with upgrading of effluent quality. The latter of these was recommended and is summarized in the following excerpt from that report:

> "In the recommended system, wastewaters generated in the Sacramento and Stockton areas would be collected, treated and discharged locally. In spite of the fact that the Stockton area has serious water quality problems, these wastewaters would not be exported for two reasons. First, it was considered desirable to keep these waters available for reclamation and reuse in the Delta or Central Valley. A high degree of treatment has been assumed for all treatment plants in these areas. Second, the costs of exporting these wastewaters are high."

Stockton's long-range plan for treatment and disposal of wastewaters involves the continued expansion and improvement of the Main water quality control plant to meet the needs of the Stockton metropolitan area for at least the next 50 years. It is expected that the 1.5 mgd Lincoln Village plant and the 3.5 mgd Stockton North plant will ultimately be consolidated with the Main water quality control plant.

THE PRESENT ENVIRONMENT

General Vicinity

Relationships to topography, geology, and previous and predicted socio-economic development, as well as the natural biological environment, should be considered in the choice of wastewater treatment plant sites. In the case of Stockton, topography and urban development have greatly influenced site location. A study of these and other matters pertaining to the Stockton sewerage area was done by Brown and Caldwell in 1964 ("Stockton Sewerage Survey, 1964-65"). To obtain a full understanding of environmental conditions and the sewerage system in the metropolitan area, one should read the 1964-65 report[1]. The following descriptions are excerpted from that report and generally reflect physical conditions of the mid 1960's that also typify the present situation. Population and economic growth for the 1970-80 period may vary greatly from the 1960 predictions. The Main plant design was based on current population predictions.

Stockton is located in the Central Valley about 50 miles south of Sacramento on the eastern edge of the Sacramento-San Joaquin Delta (Figure 2). Sewerage districts for the metropolitan area are shown in Figure 3. The Main wastewater control plant generally receives sewage from the Central Stockton service area. Wastes collected north of the Calaveras River go to either the North STP or the Lincoln Village STP. The sewerage area noted in Figure 2 includes surrounding land that may be developed for

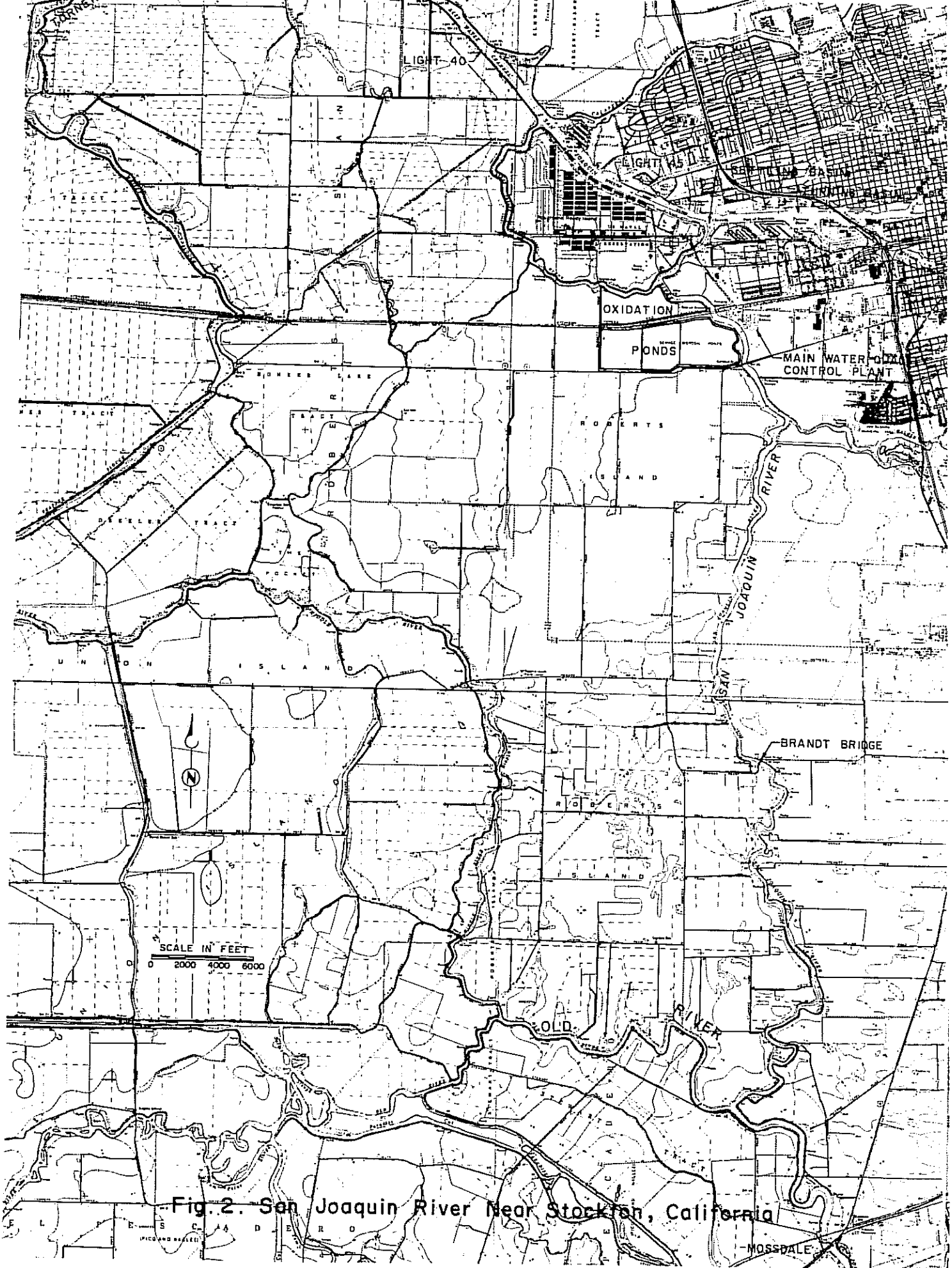

Fig. 2. San Joaquin River Near Stockton, California

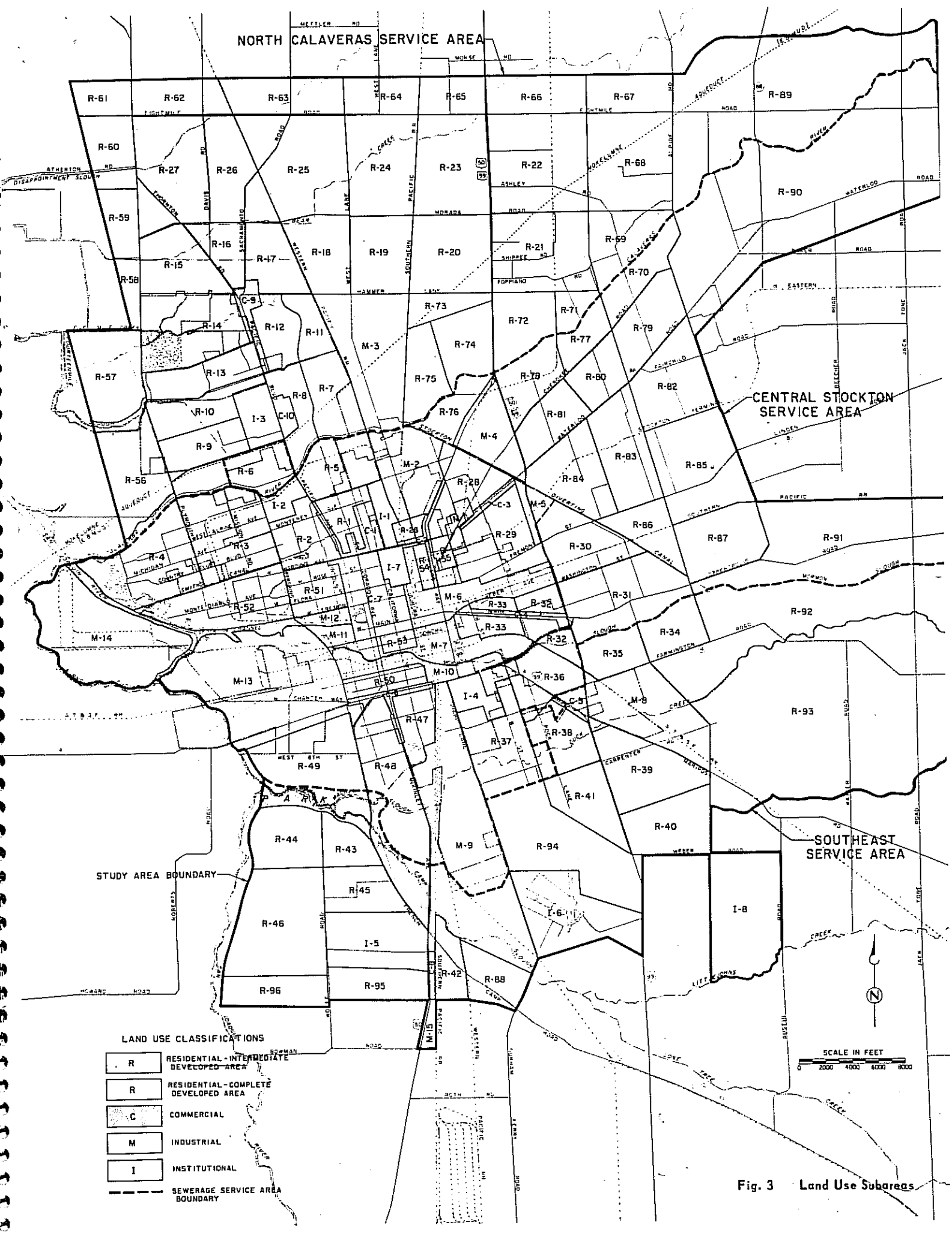

Fig. 3 Land Use Subareas

urban uses in the next 50 years. The Central Stockton service area encompasses about 53 square miles containing a 1970 population of 120,000. By comparison, the total projected service area of 125 square miles or 8.7 percent of the land area in the county has a 1970 population of 175,000. Population projections for the same areas in 1980 are 128,000 and 207,000, respectively.

Topographically, the land surface is a relatively flat plain which slopes in an east to west direction at about 5 feet per mile. Elevations range from mean sea level adjacent to the San Joaquin River to 65-75 feet at the eastern edge of the service area. There is no north-south slope. Consequently, sewage flows by gravity from east to west but must be pumped north or south. Features of slope coupled with the locations of the Calaveras River, Mormon Slough, and the San Joaquin River have greatly influenced the formation of sewerage districts.

Soils are alluvial and vary in composition from clay to sand. Peat occurs in the western part of the sewerage area. Because of a high clay content, some parts of unsewered areas require extensive leach fields for use of septic tanks. Because the water table was lowered by depletion, it does not affect the sewer collection system or use of septic tanks.

The climate in Stockton is generally typical of the Central Valley. Summers are hot and dry; rainfall occurs from late fall to early spring averaging about 14 inches per year. Winter temperatures are moderate at 40°F and freezing is rare. Sunshine

is the usual condition during the summer. Based on Sacramento data, sunshine may prevail during 93 percent of the daytime from July through September. Storms are transitory in the winter, but heavy fog may remain for several days at a time.

Stockton is the major commercial center in San Joaquin County. About 70 percent of the commercial enterprise of the county is in Stockton. Principal industries have traditionally been related to food processing. About 90 percent of the land in the county is devoted to agriculture. There is a trend toward diversification and broadening of the industrial base. Coinciding with excellent routes of transportation, including a deep-water port, industry associated with the distribution and transport of goods is locating in Stockton. General land use patterns are shown in Figure 3.

Water supplies for domestic and industrial purposes are furnished by a number of private and public agencies. Many large users have their own wells. In recent years salt water intrusion into the groundwater system has caused abandonment of some wells. From the standpoint of chemical composition, the supplies, although moderately hard, are of good quality and suitable for many uses without treatment. Total dissolved solids may generally be between 200 and 300 ppm.

Areal and population development in Stockton are thoroughly discussed in the "Stockton Sewerage Survey" report. An intermediate population (1980) of about 125,000 may reside in the Central Service District. Ultimate (2030) development may require

sewerage services for a population of 275,000. The population in the county may approximate one million under full development. Such projections are based on pre-1970 census data, thus they may be altered on further demographic analysis. However, because the enlargement and modifications of the plant are to solve immediate and foreseeable problems, the accuracy of long-term population projections are of debatable importance to this project.

Main Water Quality Control Plant Site

The Main plant is located on the south side of Navy Drive adjacent to the San Joaquin River. This site has been used for wastewater treatment purposes since 1922. It is on an alluvial plain of clayey-loam with an elevation 5 feet above mean sea level. It is protected from flooding by levees. The area is zoned industrial, and nearby commercial uses are represented by a rendering works, a concrete pipe manufacturer, an automobile wrecking yard, railroad, military reservation and others. There are no urban residential areas within one mile. Some open space remains in agriculture, but it is rapidly changing to industrial uses.

Natural areas near the plant are associated with riparian vegetation on the levees and uncultivated regions near roadways or the railroad. There are a few trees, principally cottonwood, near the levees. Otherwise vegetation is brush or grass. Most

of the open flat land is cultivated and lies fallow between crops. Wildlife using the area is probably limited to passerine birds, pheasants, rabbits, rodents, and ferrel dogs and cats.

The most noticeable features of the existing plant are the concrete structures that house various plant components. These are generally less than 30 feet in height and were designed for utility; hence, architectural effects to make them aesthetically pleasing were held to a minimum. Except for the digesters, existing structures appear in good repair and well maintained. Concrete has sloughed from the digester walls, creating an unsightly appearance that is scheduled to be repaired.

Landscaping near the plant is grass and low shrubs. Walkways, roadways and parking areas are paved and lighted. There are no apparent accumulations of trash, although some unused or unserviceable equipment is stored near the plant. A large mound of dry sludge is stored southeast of the plant while awaiting removal for use as a soil conditioner.

Air quality in the vicinity of the plant seems normal for such installations. Odors although noticeable are not significantly unpleasant. Air circulation in the area is good and residential areas are not affected. According to the plant superintendent, there have been no public complaints about odor.

The noise level in the vicinity of the plant is typical for a light industrial area. Most noises are associated with passing automobiles, trucks and trains. Machinery at the plant

creates some noise. It is most noticeable in the main building which contains the gas-powered generators. However, the level of noise was not considered to be at a nuisance level.

The location of the 640 acres of oxidation ponds is across the San Joaquin River and west of the Main plant. The area is bounded by the river, Burns Cutoff, Daggett Road and State Highway 4. Highway 4 is scheduled to become a freeway. The Atchison-Topeka and Santa Fe Railroad transects the pond site. The general layout of the ponds in respect to the immediate vicinity is shown in Figure 4. Access to the site may be gained from Highway 4 immediately west of Garwood Bridge. A dirt roadway circumscribes the ponds either on the levee or at the shore line.

The ponds are situated on a section of typical Delta farm land. Crops grown on adjacent lands are usually grains and asparagus. Walnut and fruit trees border some of the cultivated fields. Remnants of former farming operations remain inside the levees. These developments consist of a few buildings, orchards, ornamental trees and shrubs, and roadways. Natural riparian vegetation is generally bushes and grass with some large cottonwood trees which dominate the view.

The ponds were constructed to achieve internal circulation of water, protection from floods, and to protect the adjacent water table. The ponds are surrounded by a recirculation ditch which receives wastewater from the plant. Water pumped through this ditch flows by gravity to and from the ponds. An operation

is included in the recirculation system to clear the pond surface of floatable materials. The expected circulation pattern is indicated with arrows in Figure 4. Levees protect the ponds from flooding. Areas around the ponds are free of vegetation, and in a few places they have riprap erosion protection.

A ditch, deeper than the bottom of the ponds, surrounds the site. Seepage from the ponds is caught in this ditch and automatically pumped back into the ponds. In this way the adjacent water table is isolated from pond water seepages.

Water received by the ponds has undergone at least primary treatment and in most cases secondary treatment by biofiltration, secondary clarification, and chlorination. In case of plant failure, raw or partially treated wastewater may be bypassed to the ponds. There are no mats of organic matter or trash on the ponds.

The appearance of the water is typical for well-functioning ponds. Odors coming from the ponds are variable from slight to moderately strong. Strong odors would be a nuisance primarily to people passing along Highway 4 and to agricultural workers.

Wildlife in the area is associated with the ponds, riparian vegetation along the river, and the old farm sites. Of greatest significance are waterfowl on the ponds. Coots are extremely abundant; however, ducks and shorebirds are also plentiful. Riparian and farmstead birds and mammals are expected to be those that normally frequent the area. Nothing is known to lead one to think the area supports rare or endangered species or in any other way represents unusually valuable wildlife habitat.

Fish live in Pond. No. 4, the final effluent water. Fishing is not done in the pond; consequently, a good index of the fish population is not available. Fish kills have occurred in this pond that were thought to result from a combination of high temperature and low levels of dissolved oxygen. Large carp and catfish were predominant among the dead fish.

Waste Discharge Site Environment

The 23 miles of river of concern, shown on Figure 2, ranges from Mossdale to Turner Cut. Drainage from the San Joaquin system enters the reach at Mossdale, and at Turner Cut the cross Delta flow of Sacramento River water blends with flows from the Stockton area. Wastewater is discharged from Pond No. 4 through a siphon into the San Joaquin River about 1,000 feet downstream of the Atchison-Topeka and Santa Fe Railroad bridge. Another sizeable but intermittent discharge to the same location is the leachate from dredger spoilings that enters the river across from Pond No. 4. Other small sewage treatment plants discharge into this reach. These include the Lincoln Village and North treatment plants which discharge oxidation pond effluents to Fourteen Mile Slough, the Navy which discharges to Burns Cut, and the Municipal Airport discharge to a tributary of French Camp Slough.

Storm drains and other non-sewered uses also contribute oxidizable wastes to this stretch of river. Agricultural drains are considered to be minor in terms of waste loading. During periods of net downstream flow, large amounts of oxidizable

matter enter the reach via the San Joaquin River. All of these sources, in addition to the Main plant, contribute significant BOD and nutrient loading, and consequently influence water quality conditions.

The section of the San Joaquin River receiving these discharges can be considered as two different environments[3]: (1) a shallow photosynthetically productive area from Mossdale downstream to about Burns Cut and (2) the 30-foot deep ship channel where light extinction in the surface waters limits photosynthetic oxygen replenishment to about 20 percent of the water depth.

Waste loadings in combination with river flow and physical characteristics of the reach have often resulted in degradation of the river in the deep-water channel to the point of causing fish kills by asphyxiation. In this case the critical period for fish life occurs between July and October[3,6]. Other adverse conditions known to prevail relate to high numbers of coliform bacteria[7], blockages to migrations of fish[8], and impoverishment in the benthic community[9].

Dissolved oxygen in the Mossdale to Stockton section remains near saturation although considerable diurnal and day-to-day variation occurs during the summer and early autumn months[3,6]. In the Stockton deep-water channel, the level of dissolved oxygen drops in late June and remains somewhat depressed until November. During 1970 the daytime level remained between 3.5 and 7.0 mg/l[10]. In many past years it has gone below 2 mg/l. Total nitrogen in the ship channel was generally between 1 and 3 mg/l during the

first nine months of 1970, elevating to 3-5 mg/l from September through December. Occasionally dissolved oxygen and nitrogen, and coliform bacteria counts are not in compliance with policies of the Central Valley Regional Water Quality Control Board (CVRWQCB) [7].

Beneficial uses are identified by the CVRWQCB as domestic and municipal supply; agricultural and industrial supply; propagation, migration, sustenance and harvest of fish, aquatic life and wildlife; aesthetic enjoyment; navigation; and waste disposal, assimilation and transport. Recreational uses include boating, skiing, and swimming. During summer and early autumn, those uses associated with aquatic life and recreation are impaired by poor water quality. The extent of damage to aquatic life and recreational uses varies from year to year, and this variation depends primarily on relationships between biochemical oxygen demand loading and net downstream flow past Stockton.

Generally, all the freshwater and anadromous fishes that use the Delta are found in the reach from Mossdale to Turner Cut. Striped bass, catfish, largemouth bass and crappie are most important to the fishery. Salmon and steelhead migrate through the reach but do not enter the local fishery in significant quantities. Other fishes occurring in significant numbers are the threadfin shad, carp, hitch, splittail, squawfish, sculpin and bluegill [11].

The deep-water channel is very productive for zooplankton which in turn provide an essential source of food to larval striped bass and other small fishes[9,11]. This availability is especially important to striped bass larvae that hatch near and upstream of Stockton. The production of threadfin shad is important to larger striped bass and other piscivorous fishes.

Species of benthic organisms are generally typical for the Delta represented by amphipods (Corophium stimpsoni, Corophium spinicorne), clams (Corbicula, Anodonta), oligochaete worms, crayfish and chironomids. In 1963-64 the populations of Corophium appeared to be severely restricted by poor environmental conditions in the Stockton channel where bottom sediments had a high organic component, and were thought to periodically be anaerobic. Corophium are an important source of food for fish and crayfish and as such, maintain an important position in the bionomics of the river. An impoverished benthic community tends to indicate that environmental degradation is more long lasting than what is associated with oxygen depressions and the fish kills.

Wildlife use of the river is by waterfowl common to the area such as coots, shorebirds, gulls and swallows. Predatory birds, including kites, are seen along the riparian areas. Muskrat, beaver, otter, mink, raccoons and the Norway rat are known to frequent the channel and shoreline.

Eastern Delta hydraulics have a dominant influence on the ecology of the San Joaquin River from Old River near Mossdale to Turner Cut. Annually, mean monthly flows in this reach may vary from over 8,000 cfs in February to less than -200 cfs in September. As noted by negative flow, not all of the water flowing down the San Joaquin River reaches Stockton. During times when the state and federal pumps near Tracy are in operation, some or all of the San Joaquin flow is pulled down the Old River channel to the pumps. The critical period for this diversion is June through October. Supposedly about 25 percent of the river flow is diverted past Stockton, but records of actual flow have shown this factor to vary from less than zero to 28 percent, depending on pumping rates.[3]

From September through December, salmon and steelhead migrate from the ocean and across the Delta in search of the San Joaquin River. When the federal and state pumps near Tracy are in operation, it is necessary that these fish find and travel up the San Joaquin River past Stockton. If, for any reason, these fish cannot find San Joaquin River water or their passage is blocked by low dissolved oxygen, the salmon and steelhead of the San Joaquin system may be seriously damaged.[8] Combined conditions of negative net or upstream flow and low dissolved oxygen occurred in 1964 at a time when environmental studies were underway. It was determined that under such conditions, salmonids cannot find the San Joaquin River; consequently, flows down the San Joaquin were increased, rectifying the blockage by

providing positive downstream flow and raising the level of dissolved oxygen in the Stockton channel. Since 1964 a program has been carried out by California and the Bureau of Reclamation to insure that positive flows in the San Joaquin occur during the autumn.

To overcome negative flows in the reach downstream of Old River, partial blocking of Old River and flow augmentation in the San Joaquin is used. These augmented and regulated flows are used principally to afford upstream passage for salmonid fish; therefore, they come too late in the year to improve the lowest levels of dissolved oxygen which occur in August and September. Studies are underway by the State of California and the Bureau of Reclamation to determine the best means of using water releases in tributaries of the San Joaquin to improve the salmon fishery and also the general environmental quality of the river.

The loading of oxidizable organic matter to the Stockton area is greatly influenced by inflow from the San Joaquin River. Loading from the San Joaquin River is a function of inflow and has varied from 12,800 to 65,000 pounds per day in the critical period. The total long-term oxygen demand of other treatment plants, urban runoff, and non-sewered uses amount to about 4,500 to 6,500 pounds per day. Present daily loading from the Main plant may amount to 51,000 pounds per day at the peak of the cannery season. Thus, the total long-term oxygen demand on the Stockton deep-water channel may approach a peak loading of

approximately 100,000 pounds per day.[3] Considering that oxygen in the river must be at least 3 mg/l now and 5 mg/l by 1974 and that there are economic benefits to using available waste assimilative capacity, the sources and extents of these oxygen demand loadings become very germane to planning waste treatment plants.

Assessment of waste assimilation capacity in the deep-water channel is basically a problem of establishing how much oxidizable organic matter (respiration) can the channel take before oxygen levels fall below established objectives; and restoration then requires managing the input of organic matter to conform to this capacity. Oxygen concentrations in the deep-water channel are most sensitive to the rate of oxygen consumption through respiration; photosynthetic production of oxygen is not effective in reoxygenating the deep turbid channel because channel depth and turbidity limit the depth of oxygen production to the top few feet. In contrast the shallow well-lighted river reach is an autotrophic system dominated by photosynthetic oxygenation; photosynthesis-respiration (P:R) ratios in the shallow reach are high. Donwstream in the deep turbid channel, P:R ratios fall below one, classifying this area as a heterotrophic system where respiratory forces dominate and depressed oxygen values are to be expected as exemplified by the oxygen sag which occurs seasonally near Stockton.

Brown and Caldwell Engineers[3] performed a modeling study to establish relationships between levels of dissolved oxygen in the river and long-term BOD loading for the critical month of September. Initially they established the veracity of their model for predicting the level of dissolved oxygen in the river at Mossdale and in the deep-water channel. Causal relationships such as atmospheric reaeration, photosynthesis and respiration, water temperature, light penetration, algal populations, insolation, etc., were used in prediction of oxygen levels. Their model adequately predicted dissolved oxygen fluctuations in the two sections of the river, using environmental data consistent with late summer and early autumn conditions.

As previously noted, the principal regulating feature for dissolved oxygen in the deep-water channel is respiration, i.e., if the rate were increased or decreased, the oxygen regimen would change. Therefore, the respiration rate which produces any particular oxygen regimen can be expressed as the daily supply of oxidizable matter. This supply of oxidizable matter is taken to be equivalent to the assimilative capacity for the volume and dissolved oxygen objective in question.

For example, the deep-water channel between Turner Cut and the end of the turning basin has a volume of approximately 580 million cubic feet. Using the model, respiration values were determined that maintain levels of dissolved oxygen at 3 mg/l and 5 mg/l. Conversion of these respiration rates to mass of

oxidizable matter resulted in waste assimilative capacities of 67,000 and 50,000 pounds per day, respectively. Correspondingly, the total peak load approaching 100,000 pounds per day that enters the channel overloads the assimilative capacity lowering the dissolved oxygen to levels less than 3 and 5 mg/l during a few days of the year. Very low concentrations of 1-2 mg/l have caused the death of fish.

Another feature of the environment closely allied with waste loading and the dissolved oxygen problem is total nitrogen. The waste discharge policy for the reach calls for a total nitrogen level of less than 3 mg/l. This level is presently exceeded part of the time. In 1966-67 concentrations varied from 1.3 to 3.5 mg/l. Information collected and analyzed by the City of Stockton[10] during 1970 showed concentrations from about 0.5 mg/l to almost 6 mg/l. Concentrations at either end of the reach are usually less than 2 mg/l. Highest concentrations occurred during the fall of the year. About two-thirds of this nitrogen is in the nitrate form.

The reach is very productive, due in part to the abundance of available nitrogen. Algal populations in the section of the river from Mossdale to the deep-water channel are relatively dense with summer chlorophyll concentrations near 200 mg/l. By comparison, other sections of the Delta may have 50 mg/l. These algae add to the load of organic matter entering the deep-water channel and do not compensate by photosynthetic

action. Primary production in the deep-water channel is principally limited by turbidity. Any lessening of the amount of suspended matter or turbidity in the water is likely to increase algal growth and change historic oxygen-respiration relationships.

In summary, the stretch of river from Mossdale to the deep-water channel is relatively shallow and turbulent, very productive for algae, and has a waste assimilative capacity adequate to deal with organic loads flowing through the area. Contrarily, the deep-water channel is a large basin with such a long residence time that organic matter entering the basin accumulates for the length of time it takes to decompose. Thus, a heavy oxygen demand is placed on the channel. Depth and turbidity generally operate to limit photosynthesis; consequently, oxygen production is insufficient to supply the needs of respiration. During the warm months an oxygen sag exists below Stockton, and oxygen levels are occasionally depressed to a level that causes the death of fish.

Main Water Quality Control Plant Site

Changes to the present site are mostly alterations or additions to existing plant components; accordingly, the plant and pond sites now in use will be changed very little. Visually the most noticeable change will relate to construction of new administration offices, a maintenance and equipment storage building, increase in height of two trickling filters by 24 feet, installation of an incinerator, and the conversion of sludge drying beds west of the digesters to a secondary sludge lagoon.

The new buildings, trickling filters, and incinerator will change the relief of the plant with heights of about 30 feet. The new buildings are designed to be architecturally pleasing. A textured facade or new paint matching that of the new buildings will be put on older structures to cause all structures to blend together in appearance. Additional landscaping of trees, shrubs and low maintenance ground cover is to be added to further enhance the appearance of the plant site.

Other changes to the plant site are mostly concerned with renovation or enlargement of existing structures that are less visible but equally important to improvement in waste treatment. The size of the headworks is to be doubled with the addition of three new channels. Important new features of the headworks are concerned with odor control. Prechlorination facilities will be made available, and sewer gas and headworks gas will be collected

and routed upward, under positive pressure, through the trickling filter to biologically remove foul odors.

An assortment of modifications is to be made to internal treatments and wastewater distribution systems. One of significance to the environment is the installation of a new 60-inch pipeline from the secondary sedimentation tanks to the oxidation pond wastewater distribution channel. This line will be submerged across the San Joaquin River, and during its installation cause some disruption to the river. Another significant change on the plant site has to do with sludge collection, dewatering and incineration. This process requires the installation of a sludge lagoon, solids concentrating units, and one 5,000 pounds per hour multiple hearth incinerator with ash handling and storage facilities. The ash is scheduled for land disposal.

The present pond site is to be changed only at the north side of Pond No. 4. One portion of Pond No. 4 will be raised by earth filling to furnish a site for tertiary treatment facilities. These facilities consist of those tanks, pumps and rapid sand filters needed to flocculate and filter algae and other filterable matter from the final effluent. Filtered matter shall be pumped to the solids dewatering and incineration facilities. Chlorination will follow sand filtration with the water going into a chlorine contact ditch, formed by diking of Pond No. 4. Following a contact time of at least 60 minutes, it will be discharged through a siphon to Burns Cut.

The purpose of these alterations and enlargements to the plant is to increase the capacity of the plant to treat wastewater volumes and loads projected to occur during the 1970-1980 period. These treatments shall bring the wastewater discharge into compliance with waste discharge and receiving water requirements of the Central Valley Regional Water Quality Control Board. Relationships between requirements and standards and wastewater treatment practices are summarized in Appendix B.

Waste Discharge Site

As a part of the project, the wastewater discharge pipe is to be moved from its present location near the Atchison-Topeka and Santa Fe Railroad bridge to Burns Cut near Daggett Road. Relocation of the discharge point is not expected to appreciably alter wastewater discharge-water quality relationships in the area of concern. Residence time from point of discharge to the problem area, the deep-water channel, is not likely to be different.

Tertiary treatment by flocculation and filtration will greatly lessen the amount of oxidizable organic matter entering the river. At the present, the long-term BOD of the effluent may amount to 95-235 mg/l during the canning season. With a maximum monthly flow of 35 mgd during the peak canning season, the total load is 51,000 pounds per day. Based on pilot scale testing, the tertiary treatment processes will lower the long-term BOD concentration to 20 mg/l resulting in an expected 1975 load (48 mgd) of 8,000 pounds per day. Thus the post-project BOD load is expected to be 16 percent of the present peak load.

Removal of algae shall also lower the nitrogen content in the discharged wastewater. Pilot scale tests indicate that 90 percent of the organically bound nitrogen may be removed in this manner. In the case of the Stockton effluent, the total nitrogen concentration is projected to be less than 3 mg/l and in compliance with the waste discharge requirement (Appendix A). Under these circumstances the concentration in the discharge water may at times be less than the receiving water.

Removal of nutrients and organic matter from the discharged wastewater is predicted to alter water quality conditions in the receiving water. The combined long-term oxygen demand to the river should not exceed 50,000 pounds per day if dissolved oxygen is to be maintained above 5 mg/l in the deep-water channel.(3) Reduction in waste loading from the Main water quality control plant will sufficiently reduce the total load on the river to a point where 5 mg/l can be met.

There are many influences on the river and deep-water channel other than discharge from the Stockton Main water quality control plant. Complex hydraulic, waste loading, and biological events tend to change the water quality of the river annually. Many of these factors were considered by Brown and Caldwell in determination of the waste assimilative capacity of the river and in their prediction of whether water quality standards are to be met or not. Changes of great magnitude are proposed for the future, all of which will greatly affect waste assimilation capacity and water quality in the area. The ship channel may be

deepened from 30 to 32 or 35 feet which, according to the Brown and Caldwell model, may reduce the assimilative capacity by 2,500 pounds per day. During the next 10 years pumping schedules may be changed at Tracy, the Peripheral Canal may be built, water releases on streams tributary to the San Joaquin may change, agricultural wastewaters are likely to increase in volume, and so on. All of these actions cause some uncertainty about future water quality in the river from Mossdale to Turner Cut and beyond.

Remedial measures consistent with present conditions and projections have been made by various agencies. The two most likely schemes relate to releases of good quality fresh water to dilute poorer quality water and/or instream aeration programs for the deep-water channel.

One may conclude that water quality in the river is dependent on level of treatment at the Main water quality control plant, but because of the complexity of the situation in regard to influences other than wastewater discharge from the plant, the future condition of the river is uncertain.

IMPACTS OF THE STOCKTON MAIN WATER QUALITY CONTROL PLANT

Environmental Impacts

In the foregoing parts of this statement, we have discussed the environmental factors associated with the project and those installations and operations that are likely to influence the environment to some degree.

The evaluation of environmental impacts is dependent upon definitions of criteria and standards. Impacts may be beneficial, adverse or problematical. The definitions followed in this report are:

1. Beneficial environmental impacts are those that directly or indirectly improve man's environment.
2. Adverse environmental impacts are those that directly or indirectly degrade man's environment.
3. Problematical environmental impacts are those whose effect is unknown or has not been tested.

The evaluation process requires consideration of an act's impact on all environmental factors. Quite commonly an act can have both beneficial and adverse impacts. A waste treatment practice, for instance, may remove all nutrients from the wastewater which is undoubtedly beneficial. If, however, the process should add great amounts of heat, it might be finally judged as an adverse impact source.

Usually the examination of a proposal will reveal both beneficial and adverse impacts. In order to reap the benefits

of a high standard of living, society must accept some changes that are to a degree adverse.

When environmental standards have been established by some level of government, the judgement of adversity is based on these standards. If an environmental impact does not violate the established standards, it is not considered unacceptably adverse.

No legal standards exist against which to judge many impacts. In these instances the evaluator must, through some logic, establish his own. Commonly a change is viewed differently by different people. The percentage of the populace that feel one way or another may be pertinent to the evaluation in these cases. Architectural designs are often controversial though certainly intended to be beneficial additions to the scenery.

Some acts will cause changes, the impacts of which are unknown. It may be something that has never been done before or it may never have been studied. When there is no basis for impact evaluation, the only positive approach is to estimate the time and cost that will be required to test and measure the impact. The program decision makers must decide whether or not to proceed in the face of an unknown that could cause project costs or even shutdown.

In 1922 the site of the Main water quality control plant was changed from agricultural to public use. Total area of use was expanded previous to this project to include about

5 acres for the plant and 640 acres for ponds. No additional land will be required for this project. Buildings at the plant conform to or are aesthetically more pleasing than other buildings in the vicinity. Improvements, new buildings, and repairs associated with the project should enhance the appearance of the site. Landscaping around the buildings will also aid the appearance and offer food and shelter to a variety of songbirds.

Changes at the oxidation pond site will transform a portion of Pond No. 4 to dry land for use of tertiary treatment and chlorination equipment. A chlorine contact chamber will be installed, and the outfall shall be moved from the east end to near the northeast corner of Pond No. 4. Direct impacts are regarded as minor, because there are few people who use this area, i.e., use is limited to plant employees and farmers. The proposed changes are likely to have no measurable effect on wildlife in the area.

Improvements and enlargement of existing primary and secondary facilities at the plant will increase waste treatment capacity but not change the general characteristic of the treatment system. Primary and secondary treatment will produce BOD removals of 90 percent during the non-canning season and 70 percent during the canning season. This improvement in treatment efficiency shall prevent overloading of the oxidation ponds during the peak canning season. Considering that discharge of oxidizable organic wastes is one of the principal impacts of the plant on the receiving water, improvements in BOD removal shall

aid in the maintenance of good quality water in the San Joaquin River. In addition to enlargement, major modifications to the treatment process are the use of incineration for disposal of sludge-cake solids, coagulation and filtration to remove algae from the discharged wastewater, and chlorination at the outfall rather than following secondary sedimentation.

Collection, dewatering and incineration of solids may have two types of impacts on the area. At present there is a problem associated with disposal of dry sludge which is now stored as a sizeable mound on plant property. Incineration will reduce the amount of residue, facilitating disposal at a proper dump. There are no known impacts associated with this exchange of uses. Incineration of solid wastes will release gases to the atmosphere. This emission is in compliance with air control district requirements; consequently the air quality impacts were decreed to be at an acceptable level by the local authority.

The use of tertiary treatment to remove algae and other solids from the 15-40 mgd of discharged wastewater shall have a significant impact on the receiving water. This treatment shall lower the load of organic matter and total nitrogen entering the river, and thereby cause the discharge to be in compliance with requirements of the CVRWQCB, and furthermore reduce the BOD load on the river to a level that prevents the depression of oxygen below 5 mg/l. These actions will cause the receiving water to be in compliance with standards established by the Board.

Improvements in conditions of dissolved oxygen in the deep-water channel should prevent the death of fish, as occurred in the past, and improve the overall productivity of the river for a variety of game and nongame fish species.

The effect of maintaining oxygen levels below saturation on overall ecological productivity and species diversity is quantitatively undefined, but one may assume that levels below saturation, even though greater than 5 mg/l, inhibit overall productivity and species diversity. The maintenance of dissolved oxygen above 5 mg/l should not negatively influence the passage of migratory fish through the channel. Whether these improvements will appreciably change the condition of the benthic community is subject to speculation. Low dissolved oxygen in the bottom sediments may be influenced more by sedimentation characteristics than organic waste loading per se. However, one must conclude that a reduction in organic loading from a range of 20-51,000 to about 8,000 pounds per day is bound to have significant beneficial impact on the ecology of the river.

The reduction of nitrogen output from over 10 mg/l to less than 3 mg/l shall aid in the abatement of eutrophication in the Delta. Concentrations in the eastern Delta often exceed the RWQCB standard of 3 mg/l. For example, concentrations exceed 5 or 6 mg/l in late autumn. Ultimately, source control at sources in addition to the Stockton plant will be needed to meet the receiving water standard.

The reduction in the amount of algae going into the river is not likely to have much impact on oxygen production in the river because pond algae die quickly and become part of the settling detritus, thereby concentrating in the deeper water and the bottom sediments. Removal may to some degree lessen the load of organic sludge settling to the bottom, but as previously stated, it is not expected to noticeably improve ecological conditions in the benthic community.

Immediately before discharge the wastewater shall be chlorinated and detained for about 60 minutes in a contact ditch. The discharge of an effluent with a chlorine residual may endanger fish coming in contact with the relatively undiluted wastewater; consequently, a potential for an adverse impact exists. Avoidance of such an adverse impact depends to a large extent on close monitoring of the chlorine residual at the outfall with correlative adjustments in the feed rate. Chlorination shall cause the plant to meet coliform discharge requirements, but it is doubtful if chlorination will change the coliform counts of the receiving water.

Construction at the plant and the pond site will cause temporary impacts on the neighborhood. Noise, dust, and disruptions to traffic shall occur on an intermittent basis over the one-year construction period.

The present level of noise from operation of the plant will not increase. Noise resulting from traffic in and about the plant will increase proportional to increases in traffic.

Odorous gases from the plant will be lessened with the installation of prechlorination and the exhausting of the main sewer and headworks through the trickling filter for treatment. Odors caused by overloading the oxidation ponds will become less frequent as a result of increased primary and secondary treatment capacities that handle peak loading situations.

Waste treatment capacity at the plant will be increased to service domestic and industrial waste loads projected to occur between the present and 1980. These projections reflect a pattern of rapid growth in residential and industrial plant. The waste treatment system is designed to minimize the impact of wastewater from these uses on the San Joaquin River. There is a potential for subsidiary impacts on air quality, traffic, socio-economic institutions, and personal interrelationships. Impacts on other features of the environment resulting from this growth are not considered in detail within the framework of this impact statement.

Beneficial Impacts

The principal beneficial impact is the reduction in oxidizable organic matter discharged to the river. Bringing the organic load on the Stockton deep-water channel into the realm of its waste assimilative capacity shall have rewards for all beneficial uses, especially those related to aquatic life and recreation. The maintenance of dissolved oxygen in the river at levels greater than 5 mg/l will cause the aquatic community

to return to nearly normal conditions. Migratory fishes will not be impeded in their journeys, and recreational users may receive greater enjoyment from their pastimes.

The reduction in nitrogen and other nutrients and waste materials entering the Delta shall aid in the maintenance of acceptable water quality throughout the river and Delta. These reductions have residual benefits to other waste dischargers, water users, and water project operators that are otherwise undefined.

Improvements in architecture, landscaping and odor control will make the plant more aesthetically pleasing as well as more efficient in the operational sense. There is benefit to having waste treatment capacity available for future domestic and industrial uses because these uses tend to come about whether treatment is available or not, and uncontrolled growth often overshoots waste treatment capacities, resulting in deterioration of the environment. This project is scheduled to provide adequate waste treatment for the service district until 1980.

Adverse Impacts

Although improvement in the quality of the discharged wastewater is the principal beneficial impact of the project, the discharge of 8,000 pounds per day of BOD into a waterway as overloaded with decomposable materials as the river from Mossdale to Turner Cut has to be considered an adverse impact. Providing the receiving water meets established standards, waste

assimilation capacity is not exceeded; but this state does not mean that the river is in good ecological condition, only that it is in an acceptable condition by regulatory decree. Cessation of the Main plant discharge, even after implementation of tertiary treatment, would improve ecological conditions in the river. Accordingly, continuance of the discharge will have adverse impacts although greatly lessened in comparison to past years.

Use of incineration for disposal of sludge cake may be an adverse impact in that it causes gases and particulate matter to enter an atmosphere that on occasion does not comply with air quality standards. Further, incineration of the sludge destroys a material that is valuable as a soil conditioner, although its use is not now economically profitable.

Installation of a 60-inch wastewater conduit from the Main plant to the oxidation ponds will adversely affect the river environment during the time of installation. A small area of bottom and benthic community will be destroyed although recovery should take place in less than one year. The prevailing amount of turbidity and suspended solids will be increased for short periods of time. None of these impacts are thought to be of great significance to the ecology of the river.

Chlorination of the discharge may adversely affect aquatic life in the vicinity of the outfall. The degree of the impact will coincide with control of rate of chlorination in respect to flow and chlorine demand. Although toxicity associated with

chlorination is deemed adverse, if controlled, it is considered acceptable for purposes of protection of public health.

Construction activities will impose inconvenience on traffic, cause intermittent increases in noise and possible dust. Although these impacts may be a nuisance, they will be transitory.

Problematical Impacts

The use of fine quality agricultural land for a waste treatment plant can easily be thought of as a poor land use practice. However, this land has been in such use since 1922 and to change locations would conceivably be more adverse. Sewerage service for the existing community is essential to its health and ecological well being.

Proposed changes to the plant will enable the Main plant to accommodate a 1980 population of 138,000. This compares to a 1970 population of 120,000. Such an increase in population will have impacts both beneficial and adverse, outside the responsibility of this project. Increases in population or industry may significantly add to the waste load on the river through unsewered means, and therefore further degrade the river environment. Growth that uses the additional wastewater treatment capacity will have impacts on other utilities, e.g., schools, power, circulation routes, medical care, recreation, etc., that in turn will need enlargement and further affect the environment. Such a chain of events is generally undefined and not within the responsibility of the Public Works Department.

For the purpose of design capacity, a utility such as the wastewater treatment plant must reflect, as this project does, the projected sewerage needs of society as determined by local or state planning agencies. By being in compliance with local and state regulations, the plant is essentially performing such a function. Concern for the overall impact of growth and a power to regulate such growth resides with entities other than the Public Works Department. In conclusion, if the growth associated with this plant is assessed for environmental impacts, such an assessment should be done for the region and not the district.

Probable Adverse Impacts Which Cannot Be Avoided

Although managed to greatly lessen adverse effects, the discharge of a municipal wastewater into the Old River-Turner Cut reach of the San Joaquin River is considered an adverse impact. This impact is thought to be unavoidable at this time; however, future developments relative to reuse or conveyance to a new point of discharge may alter this situation.

Use of the land for wastewater treatment has an impact on over one square mile of agricultural land. This use is considered unavoidable in order to achieve improvements in the river environment. Construction activities will inevitably cause local disruptions; however, these impacts are of short duration and generally result in improvements beneficial to the local community.

Mitigation Measures Proposed to Minimize Impacts

The enlargement and modification of the existing plant is the principal and immediate measure to mitigate the environmental impacts of the discharged wastewater on the San Joaquin River. In addition air treatment systems will be installed to minimize odor.

Damages and disruptions that occur during construction are to be minimized by planning and close supervision.

Architectural improvements to the existing buildings and landscaping will be used to make the plant more aesthetically pleasing.

Alternatives to Proposed Action

To avoid the proposed actions would result in further degradation of the San Joaquin River and Delta environment. Rapid alleviation of the organic waste load may only be accomplished by the proposed project.

Relocation of the plant to another site would cause unmanageable disruptions in sewerage service. In addition, no other site has been researched for this purpose. Thus, delay in the upgrading of the discharged wastewater, coinciding with planning for relocation, would cause great and extended harm to the river environment.

Alternatives to the point of discharge and reuse of the wastewater were considered in the San Francisco Bay-Delta Water Quality Control Program. It was recommended in this report

that wastewaters be collected, treated and discharged locally, because it was considered desirable to keep these wastewaters available for reuse in the local area. Any regional plan for the Stockton area will have to be based on alternatives pertaining to local and San Joaquin Valley needs. Such a plan may culminate from the basin-wide water quality planning now in progress for the State Water Resources Control Board.

Short-Term Use Versus Long-Term Productivity

Improvement in the quality of the discharged wastewater shall definitely furnish short-term benefits for the production of aquatic life by enabling the maintenance of a higher level of dissolved oxygen in the deep-water channel. The identification of long-term benefits is less certain, because other events may overshadow environmental influences attributable to improvement in the Main plant discharge. Such events are: increases in waste discharge from the North or Lincoln Village treatment plants, increase in organic loading via the San Joaquin Valley, installation and operation of the Peripheral Canal, and enlargement of the Stockton deep-water channel. One may assume that the long-term productivity of the river depends more on regional management of water and wastewater flows than on any individual discharger.

Whether the section of land used by the plant would be more productive in agriculture than in its present use would be difficult to determine. In any case, the land is not irrecover-

able for agricultural uses, if the need should arise. The present use conforms with planned long-term industrial zoning of the area.

Irreversible and Irretrievable Commitments of Resources

There are no features of the project that cause irretrievable commitments of resources. Use of the site for wastewater treatment now and in the near future may irreversibly establish a pattern of use. The ultimate size of the collection system and the wastewater treatment plant may require that its use for waste treatment continue for lack of feasible alternatives.

Local Objections to the Project, If Any

There are no known objections to the project. The project is designed to meet requirements of the CVRWQCB which were established by way of public hearing. Failure to meet these requirements would result in the arousal of public concern and objections.

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APPENDIX A

RESOLUTION
CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD
WASTE DISCHARGE REQUIREMENTS
FOR THE
CITY OF STOCKTON
MAIN WATER QUALITY CONTROL PLANT
SAN JOAQUIN COUNTY

RESOLUTION NO. 69-200 ADOPTED: 2/14/69

WHEREAS, THE CITY OF STOCKTON TREATS MUNICIPAL AND INDUSTRIAL WASTES IN A TREATMENT WORKS LOCATED ON THE SAN JOAQUIN RIVER; AND

WHEREAS, THE NATURE OF DISCHARGES FROM THESE FACILITIES HAS BEEN GOVERNED BY RESOLUTION NO. 106 (51-85) ADOPTED BY THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD ON 7 NOVEMBER 1951; AND

WHEREAS, TREATED WASTES FROM THE STOCKTON MAIN PLANT ARE DISCHARGED TO THE SAN JOAQUIN RIVER, OR TO BURNS CUT-OFF WHICH IS TRIBUTARY TO THE SAN JOAQUIN RIVER ON EITHER END; AND

WHEREAS, THE SAN JOAQUIN RIVER AND TRIBUTARY CHANNELS IN THIS AREA ARE A PART OF THE DELTA WATERS AS DEFINED IN THE "WATER QUALITY CONTROL POLICY FOR THE SACRAMENTO-SAN JOAQUIN DELTA" (DELTA WATER QUALITY CONTROL POLICY) AS ADOPTED BY THE STATE WATER QUALITY CONTROL BOARD (NOW STATE WATER RESOURCES CONTROL BOARD); AND

WHEREAS, BENEFICIAL USES OF THESE WATERS, AS IDENTIFIED IN THE AFORESAID POLICY ARE: DOMESTIC AND MUNICIPAL SUPPLY; AGRICULTURAL AND INDUSTRIAL SUPPLY; PROPAGATION, MIGRATION, SUSTENANCE AND HARVEST OF FISH, AQUATIC LIFE AND WILDLIFE; RECREATION; ESTHETIC ENJOYMENT; NAVIGATION; AND WASTE DISPOSAL, ASSIMILATION AND TRANSPORT. IN THE STOCKTON AREA, RECREATION USES INCLUDE BOATING, YACHTING, SKIING AND SWIMMING; AND

WHEREAS, THE AFOREMENTIONED POLICY PRESCRIBES A SET OF WATER QUALITY OBJECTIVES FOR THESE WATERS; AND

WHEREAS, IT IS THE INTENT OF THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD TO PRESERVE THE QUALITY OF THE SAN JOAQUIN RIVER AND OTHER DELTA WATERS WITHIN THE LIMITS PRESCRIBED BY THE DELTA WATER QUALITY CONTROL POLICY; AND

WHEREAS, IT IS FURTHER THE INTENT OF THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD TO SO REGULATE WASTE DISCHARGES INTO THESE WATERS INCLUDING THE DISCHARGE FROM THE CITY OF STOCKTON MAIN WATER QUALITY CONTROL PLANT SO AS TO CONFORM TO THE DELTA WATER QUALITY CONTROL POLICY; THEREFORE BE IT

RESOLVED, THAT THE FOLLOWING REQUIREMENTS SHALL GOVERN THE NATURE OF ANY WASTE DISCHARGE FROM THE STOCKTON MAIN WATER QUALITY CONTROL PLANT:

1. ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL:

   A. BE ADEQUATELY DISINFECTED AND IN NO CASE SHALL CAUSE THE RECEIVING WATERS TO EXCEED A MEDIAN FECAL COLIFORM LEVEL OF 200/100 ML.

B. NOT CAUSE THE DISSOLVED OXYGEN CONTENT OF THE RECEIVING WATERS TO FALL BELOW 5.0 MG/L AT ANY TIME.

C. NOT CAUSE THE TOTAL NITROGEN CONTENT OF RECEIVING WATERS TO EXCEED 3.0 MG/L.

D. NOT CAUSE CONCENTRATIONS OF MATERIALS IN THE RECEIVING WATERS WHICH ARE DELETERIOUS TO HUMAN, PLANT OR AQUATIC LIFE.

E. NOT CONTAIN RECOGNIZABLE SOLIDS OF SEWAGE OR WASTE ORIGIN.

F. NOT CAUSE FUNGUS GROWTHS IN THE RECEIVING WATERS OR ON STREAM BANKS.

G. NOT CAUSE OBJECTIONABLE CONCENTRATIONS OF FLOATING OR EMULSIFIED GREASE OR OIL IN DELTA WATERS.

H. NOT CAUSE DETECTABLE TASTE OR ODOR IN ANY PUBLIC WATER SUPPLY.

I. NOT CAUSE SLUDGE DEPOSITS IN THE RECEIVING WATERS.

J. NOT CAUSE OBJECTIONABLE COLOR IN THE RECEIVING WATERS.

K. NOT CAUSE THE MEAN MONTHLY TOTAL DISSOLVED SOLIDS (TDS) OF RECEIVING WATERS TO INCREASE ABOVE 500 MG/L, AS MEASURED ON THE BASIS OF THE AVERAGE MEAN DAILY VALUES FOR ANY CALENDAR MONTH.

L. NOT CAUSE THE BIOCIDE CONTENT, AS DETERMINED BY THE SUMMATION OF INDIVIDUAL CONCENTRATIONS, TO INCREASE ABOVE 0.6 UG/L; NOR SHALL THE CONCENTRATIONS OF INDIVIDUAL OR COMBINATIONS OF PESTICIDES IN THE DELTA WATERS, AS A RESULT OF THIS DISCHARGE, REACH THOSE LEVELS FOUND TO BE DETRIMENTAL TO FISH OR WILDLIFE.

M. NOT CAUSE THE PH OF RECEIVING WATERS TO FALL BELOW 6.5; NOR TO EXCEED 8.5.

2. NEITHER THE WASTE DISCHARGE NOR THE METHOD OF DISPOSAL SHALL CAUSE A PUBLIC NUISANCE BY REASON OF ODORS OR UNSIGHTLINESS.

3. WASTE DISCHARGE SHALL NOT CAUSE A POLLUTION OF USABLE GROUND OR SURFACE WATERS.

RESOLVED, FURTHER, THAT BECAUSE OF THE TIME-LAG INHERENT IN PUBLIC WORKS CONSTRUCTION, THE CITY OF STOCKTON IS HEREBY GRANTED A PERIOD OF NOT TO EXCEED FIVE YEARS FROM THE DATE OF ADOPTION OF THIS RESOLUTION TO BRING ITS WASTE DISCHARGE INTO FULL COMPLIANCE WITH THE REQUIREMENTS PRESCRIBED HEREIN, EXCEPTING THAT THE CITY OF STOCKTON WILL BE HELD FULLY ACCOUNTABLE FOR COMPLYING WITH THE REQUIREMENTS OF RESOLUTION NO. 51-85 WHICH SHALL ALSO REMAIN IN EFFECT TO GOVERN THE WASTE DISCHARGES FROM THE CITY OF STOCKTON THROUGHOUT THE AFOREMENTIONED FIVE YEAR INTERIM PERIOD; AND BE IT

RESOLVED, FURTHER, THAT THE CITY OF STOCKTON SHALL SUBMIT QUARTERLY PROGRESS REPORTS DEMONSTRATING THAT ACTIVITIES AND CONSTRUCTION FOR ACHIEVING COMPLIANCE WITH THESE REQUIREMENTS IN FIVE YEARS IS UNDER WAY AND ON SCHEDULE; AND BE IT

RESOLVED, FURTHER, THAT THE DISCHARGER SHALL REPORT PROMPTLY TO THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD ANY FUTURE CHANGES IN THE WASTE DISCHARGE OR CHANGES IN THE CONDITIONS ASSOCIATED WITH ITS DISPOSAL; AND BE IT

RESOLVED, FURTHER, THAT THE DISCHARGER MAY BE REQUIRED TO SUBMIT TECHNICAL REPORTS RELATIVE TO THE WASTE DISCHARGE AS PROVIDED UNDER SECTION 13055 OF DIVISION 7, CALIFORNIA WATER CODE.

IF, IN THE FUTURE, THERE IS A CHANGE IN THE CONDITIONS OF THE DISCHARGE, OR USE OF THE DISPOSAL AREA, IT MAY BE NECESSARY FOR THE CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD TO REVISE THESE REQUIREMENTS.

THESE REQUIREMENTS DO NOT CONSTITUTE A LICENSE OR PERMIT; NEITHER DO THEY AUTHORIZE THE COMMISSION OF ANY ACT RESULTING IN INJURY TO THE PROPERTY OF ANOTHER, NOR DO THEY PROTECT THE DISCHARGER FROM HIS LIABILITIES UNDER FEDERAL, STATE, OR LOCAL LAWS.

/s/ John Van Assen
CHAIRMAN

ATTEST:

/s/ Charles T. Carnahan
EXECUTIVE OFFICER

EXPLANATION OF REQUIREMENTS

CITY OF STOCKTON
MAIN WATER QUALITY CONTROL PLANT
SAN JOAQUIN COUNTY

REQUIREMENT No. 1-A. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (A) BE ADEQUATELY DISINFECTED AND IN NO CASE SHALL CAUSE THE RECEIVING WATERS TO EXCEED A MEDIAN FECAL COLIFORM LEVEL OF 200/100 ML."

THE DELTA WATER QUALITY CONTROL POLICY DIRECTS THAT FECAL COLIFORM IN THESE WATERS SHALL NOT EXCEED 200 PER 100 ML.

REQUIREMENT No. 1-B. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (B) NOT CAUSE THE DISSOLVED OXYGEN CONTENT OF THE RECEIVING WATERS TO FALL BELOW 5.0 MG/L AT ANY TIME."

THE DELTA WATER QUALITY CONTROL POLICY SPECIFIED THAT DELTA WATERS SHALL REMAIN ABOVE 5.0 MG/L.

ASSIMILATIVE CAPACITY OF THE SAN JOAQUIN RIVER AND ITS CONNECTED BODIES OF WATER IN THE STOCKTON AREA IS A COMPLEX ISSUE. AGRICULTURAL WASTES, THE CONFORMATION OF THE DEEP WATER CHANNEL AND HARBOR AREA, LONG-TERM RESIDENCE EFFECTS ON MULTIPLYING THE 5-DAY B.O.D., AND OTHER FACTORS CREATE INTERACTING FORCES TO DEPLETE OXYGEN IN THESE WATERS. IT IS OBVIOUS, HOWEVER, THAT ASSIMILATIVE CAPACITY IS EXHAUSTED WHEN THESE WATERS FALL BELOW 5.0 MG/L IN OXYGEN, AND ANY DISCHARGE OF OXYGEN DEMANDING SUBSTANCES UNDER SUCH CIRCUMSTANCES CONSTITUTES AN EXTENSION OF THE VIOLATION OF DELTA OXYGEN OBJECTIVES.

IT IS THE INTENT OF THIS REQUIREMENT THAT DISCHARGES OF OXYGEN DEMANDING SUBSTANCES SHALL CEASE WHEN THE OXYGEN CONTENT OF RECEIVING WATERS FALLS BELOW 5.0 MG/L.

REQUIREMENT No. 1-C. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (C) NOT CAUSE THE TOTAL NITROGEN CONTENT OF RECEIVING WATERS TO EXCEED 3.0 MG/L."

DELTA WATER QUALITY CONTROL POLICY PROVIDES THAT THE TOTAL NITROGEN CONTENT (ORGANIC + NH_3 + NO_2 + NO_3) SHALL NOT EXCEED 3.0 MG/L. WASTE ASSIMILATIVE CAPACITY (WAC) OF THE SAN JOAQUIN RIVER, STOCKTON AREA, IS A FUNCTION OF STREAM FLOW AND RECEIVING WATER NITROGEN LEVELS. EXPRESSED MATHEMATICALLY:

$$WAC = K\,(F)\,\,(3.0 - N)$$

WHERE K = A PROPORTIONAL FACTOR

F = STREAM FLOW

N = TOTAL NITROGEN PRESENT IN THE WATER

AMENDED 2/14/69

IT IS APPARENT FROM THE ABOVE EQUATION THAT WAC IS ZERO OR NEGATIVE WHEN THE TOTAL NITROGEN OF THE RECEIVING WATERS IS 3.0 MG/L OR GREATER. BASED UPON THIS CONCEPT, THE NITROGEN REGULATION FOR THE CITY OF STOCKTON ALLOWS USE OF THE ASSIMILATIVE CAPACITY, WHEN AVAILABLE.

REQUIREMENT NO. 1-D. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (D) NOT CAUSE CONCENTRATIONS OF MATERIALS IN THE RECEIVING WATERS WHICH ARE DELETERIOUS TO HUMAN, PLANT OR AQUATIC LIFE."

REQUIREMENT NO. 1-E. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (E) NOT CONTAIN RECOGNIZABLE SOLIDS OF SEWAGE OR WASTE ORIGIN."

REQUIREMENT NO. 1-F. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (F) NOT CAUSE FUNGUS GROWTHS IN THE RECEIVING WATERS OR ON STREAM BANKS."

REQUIREMENT NO. 1-G. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (G) NOT CAUSE OBJECTIONABLE CONCENTRATIONS OF FLOATING OR EMULSIFIED GREASE OR OIL IN DELTA WATERS."

REQUIREMENT NO. 1-H. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (H) NOT CAUSE DETECTABLE TASTE OR ODOR IN ANY PUBLIC WATER SUPPLY."

REQUIREMENT NO. 1-I. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (I) NOT CAUSE SLUDGE DEPOSITS IN THE RECEIVING WATERS."

REQUIREMENT NO. 1-J. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (J) NOT CAUSE OBJECTIONABLE COLOR IN THE RECEIVING WATERS."

REQUIREMENTS 1-D THROUGH 1-J PROVIDE THAT THE CITY OF STOCKTON WASTE DISCHARGES SHALL NOT CAUSE VIOLATION OF CONDITIONS AS ESTABLISHED IN THE DELTA WATER QUALITY CONTROL POLICY.

REQUIREMENT NO. 1-K. "ANY OF THE PLANT EFFLUENT, REACHING SURFACE WATERS OF THE AREA, BY ANY MEANS WHATSOEVER, SHALL: (K) NOT CAUSE THE MEAN MONTHLY TOTAL DISSOLVED SOLIDS (TDS) OF RECEIVING WATERS TO INCREASE ABOVE 500 MG/L, AS MEASURED ON THE BASIS OF THE AVERAGE MEAN DAILY VALUES FOR ANY CALENDAR MONTH."

THE CONCEPT OF ASSIMILATIVE CAPACITY AVAILABILITY, AS APPLIED UNDER REQUIREMENT NO. 1-C, APPLIES IN EXACTLY THE SAME FASHION TO TDS. IN THIS MATTER, DELTA WATER QUALITY CONTROL POLICY PROVIDES THAT WATERS IN THE STOCKTON AREA NOT EXCEED 500 MG/L TDS.

Requirement No. 1-L. "Any of the plant effluent, reaching surface waters of the area, by any means whatsoever, shall: (L) Not cause the biocide content, as determined by the summation of individual concentrations, to increase above 0.6 ug/L; not shall the concentrations of individual or combinations of pesticides in the Delta waters, as a result of this discharge, reach those levels found to be detrimental to fish or wildlife."

Requirement No. 1-M. "Any of the plant effluent, reaching surface waters of the area, by any means whatsoever, shall: (M) Not cause the pH of the receiving waters to fall below 6.5; nor to exceed 8.5."

Requirements 1-L and 1-M provide that City of Stockton waste discharges shall not cause violations of conditions established in the Delta Water Quality Control Policy.

Requirement No. 2. "Neither the waste discharge nor the method of disposal shall cause a public nuisance by reason of odors or unsightliness."

Requirement No. 3. "Waste discharge shall not cause a pollution of usable ground or surface waters."

These are standard requirements prohibiting nuisance and pollution, as these terms are defined in the California Water Quality Control Act.

CITY OF STOCKTON
MAIN WATER QUALITY CONTROL PLANT
San Joaquin County

The City of Stockton Main Water Quality Control Plant is located on both sides of the San Joaquin River about 1/2 mile downstream of Garwood Bridge (Hiway 4). Screening, pumping, sedimentation, and biofiltration processes are located on the east side of the river, while oxidation lagoons are located on the west side of the river on Roberts Island. Discharge is normally from the oxidation lagoons to the river, although discharge may also be made, at times, from the east side facilities. As disposal areas on Roberts Island extends northerly to abut Burns Cut-Off, this watercourse could eventually receive treatment plant effluents.

Waste discharge requirements were established for the City of Stockton in 1951 (Resolution No. 51-85). Since that time, material expansions in waste loadings and treatment facilities have been made. At this time, further major expansions in waste inflows to the treatment works are anticipated. By 1969, flow increases of 22.5 mgd (60% increase) and raw sewage B.O.D. increases of 68,000 pounds per day (48% increase) are projected. Certain new treatment facilities are proposed by the City of Stockton to adequately treat the enlarged load.

A complete discussion of Delta water uses, quality factors, and quality control programs are set forth in the "Delta Water Quality Control Policy." This policy enunciates specific water quality objectives, consisting of quality indicators with prescribed limits.

Beneficial uses of Delta waters, which include the San Joaquin River and Burns Cut-Off, are enumerated in the subject Policy as:

1. Uses to be protected:

    A. Domestic and Municipal Supply
    B. Agricultural Supply
    C. Industrial Supply
    D. Propagation, sustenance and harvest of fish, aquatic life, and wildlife
    E. Recreation
    F. Aesthetic Enjoyment

2. Economic beneficial uses:

    A. Waste Disposal
    B. Waste Assimilation
    C. Waste Dispersion

Quality objectives for the Delta waters, as enunciated in the policy, are reproduced on an attachment hereto.

In formulating discharge regulations for the City of Stockton, it is the intent of the Central Valley Regional Water Quality Control Board to achieve and preserve the established Delta water quality objectives; and to maintain the quality of Delta waters at the highest possible levels consistent with maximum benefit to the people of California.

APPENDIX B

COMPLIANCE WITH DISCHARGE REQUIREMENTS

Each of the specific prescribed discharge requirements applicable to wastewater treatment facilities is listed below accompanied with an explanation of how these requirements will be met. The general requirements related to Requirement No. 2 (Public Nuisance) or Requirement No. 3 (Pollution of Usable Waters) are assured to be in compliance based on the comprehensive coverage given the specific items listed under Requirement No. 1 below.

1. Any of the plant effluent, reaching surface waters of the area, by any means whatsoever, shall:

   A. Be adequately disinfected and in no case shall cause the receiving waters to exceed a median fecal coliform level of 200/100 ML.

      Effluent chlorination is being provided including a chlorine contact channel which will provide 60 minutes detention under ultimate development. The anticipated effluent quality as shown in Table 3 is a fecal coliform MPN of 5 per 100 ml. River fecal coliform values several miles upstream from the discharge are known to exceed the water quality standard of 200 per 100 ml; in view of the high bacterial densities in the river, compliance with receiving water objectives will be demonstrated by effluent monitoring.

   B. Not cause the dissolved oxygen content of the receiving waters to fall below 5.0 mg/l at any time.

      Compliance with the 5 mg/l dissolved oxygen objective, as worded, for the river is necessarily tied to cause and effect. Should the river DO fall below 5 mg/l, all of the factors affecting oxygen must be put in perspective. An analysis of these factors is contained in a November 1970 report which describes benefits of proposed tertiary treatment to San Joaquin River water quality.(1) The projected quality of the effluent will improve local river water quality; the report describes the many factors affecting assimilative capacity, the sources of oxidizable matter and effects of hydraulic changes in the eastern Delta. The analysis of treatment effects and river oxygen dynamics shows that dissolved oxygen in the channel can be maintained above 5.0 mg/l under present and anticipated future river conditions.

(1) City of Stockton, Main Water Quality Control Plant 1969 Enlargement and Modification Study, Part 2 Benefits of Proposed Tertiary Treatment to San Joaquin River Water Quality, Brown and Caldwell, November 1970.

C. Not cause the total nitrogen content of receiving waters to exceed 3.0 mg/l.

Nitrogen will be removed to accomplish an anticipated average effluent quality of no more than 3.0 mg/l total nitrogen. Removal is accomplished by several factors including denitrification in the ponds in winter and removal of suspended algal cells from the oxidation pond effluent. The ability of algal removal systems to reduce nitrogen concentrations has been demonstrated at the Interagency Agricultural Wastewater Treatment Center at Firebaugh, California, where algal removal affected 90 percent reduction in nitrogen leaving less than 2 mg/l in the effluent.(2)

D. Not cause concentrations of materials in receiving waters which are deleterious to human, plant or aquatic life.

A great variety of toxicants and other deleterious substances are present in municipal and industrial wastewaters. The removal or degradation of such substances to produce an effluent of acceptable quality often involves a combination of physical, biological and chemical processes. Some of the major toxicants in wastewaters are ammonia, heavy metals and exotic organics such as detergents and pesticides. The Main Water Quality Control Plant will offer biological processes to oxidize ammonia and break down LAS in detergents. In addition, the oxidation ponds provide a means to remove toxicants such as chlorinated hydrocarbon pesticides which will accumulate in the algae and be removed with them. Heavy metals are not expected to be a problem at Stockton where digester operation has not been difficult; nonetheless, chemical additions to accomplish algal removal will also assist in removal of other toxicants such as the metals. Toxicity assays of pond effluent did demonstrate some toxicity in a single test in 1970 by the Federal Water Quality Control Administration; however, the TLm reported (75 percent) by the agency indicates only a relatively low level of toxicity at that time.(3) The improvements to the plant, particularly the tertiary process, is expected to adequately protect receiving waters from toxic emissions.

E. Not contain recognizable solids of sewage or waste origin.

The many processes in the existing and proposed facilities which remove solids will continue to guarantee compliance with the objective. The FWQA survey in 1970 revealed no problems of this nature in the river.

(2) Beck, Louis A., Nitrogen Removal from Agricultural Wastewater, Advanced Waste Treatment Seminar, San Francisco, October 1970.

(3) Federal Water Quality Administration, Water Quality Survey Report - Waste Treatment and Receiving Waters, Stockton, California, April 1970.

F. Not cause fungus growths in the receiving waters or on stream banks.

Fungus growths are not anticipated and not known to have been a problem in the Stockton area in the recent past. Further treatment including nutrient removal offered by the improvements proposed gives further assurance that this objective will be met.

G. Not cause objectionable concentrations of floating or emulsified grease or oil in Delta waters.

Floating or emulsified grease or oil is not a major constituent in the city's discharge and equipment available for skimming the plant will continue to accomplish compliance with this objective. No objectionable quantities of oil or grease were noted in the 1970 survey by FWQA except in the Port area.

H. Not cause detectable taste or odor in any public water supply.

Public water supplies are not threatened by the discharge and the usual causes of taste or odors are being removed by the ponding and proposed tertiary treatment processes.

I. Not cause sludge deposits in the receiving waters.

Settleable materials are being removed through the present treatment systems; no receiving water quality problem has been shown and continued compliance is assured by the nature of the improvements.

J. Not cause objectionable color in the receiving waters.

Discolorations evident in the San Joaquin River and reported in past water quality survey reports have largely been attributable to algal growths. The tertiary treatment processes which will remove algae in the oxidation pond effluent and reduce the nutrient loadings to the river will lessen the likelihood and frequency of discolorations caused by algal growth in the enriched river. Control of upstream nutrient sources would be required to bring water quality standards into compliance; implementation of the improvements planned by the City of Stockton will insure that future discolorations in the channel are not caused by the City's Main Water Quality Control Plant.

K. Not cause the mean monthly total dissolved solids (TDS) of receiving waters to increase above 500 mg/l, as measured on the basis of the average mean daily values for any calendar month.

The City has engaged consultants with a view to evaluation of a water supply improvement program whereby the high mineral content of the present city groundwater supply could be reduced by blending with impounded waters of low mineral content. Further reduction in wastewater mineral content can be achieved through implementation of industrial waste ordinances directed toward high TDS dischargers. The 5-year extension for meeting this particular requirement which was granted by the Regional Board allows time to carry out a program for reducing wastewater mineral content. Both of these possible actions are deemed more appropriate than any demineralization program at the Main Water Quality Control Plant. Receiving waters do exceed 500 mg/l TDS at times; compliance with the above can best be demonstrated by reduction of the city's mineral loading at the source.

L. Not cause the biocide content, as determined by the summation of individual concentrations, to increase above 0.6 ug/l; nor shall the concentrations of individual or combinations of pesticides in the Delta waters, as a result of this discharge, reach those levels found to be detrimental to fish or wildlife.

Biocide content of the city's wastewater has been found to exceed 0.6 ug/l when viewed as total maximum chlorinated hydrocarbons. Removal of chlorinated hydrocarbons within the water quality control plant was observed during the FWQA survey based on composite sampling over one day of influent and the effluent from the secondary treatment and the lagoon effluent. Biocides are taken up by algae and it is reasonable to expect algal removal will show further improvement in effluent quality. The receiving waters approach or exceed the water quality objective for biocides in the irrigation season, the time when algal growth and consequent biocide uptake is most efficient. Compliance should be demonstrable on the basis of the information available.

M. Not cause the pH of receiving waters to fall below 6.5; nor to exceed 8.5.

The pH of the effluent will be within the established limits and photosynthetic production or respiratory effects on pH from pond algae will be eliminated by algal removal. Compliance is assured.